



CASE STUDY

A Hybrid Pathway To Low-Carbon Ventilation

Make-Up Air Retrofit at 1529 W Pender St, Vancouver

Market Rental

1529 W Pender St, Vancouver



Retrofit Overview

A low-efficiency, gas-heated make-up air (MUA) system in a Vancouver market rental building was upgraded to a hybrid dual-fuel heat pump MUA system. The MUA system provides tempered outdoor air to ventilate the building’s corridors and replace air removed through exhaust systems. It also helps maintain positive pressurization, supporting indoor air quality and reducing odour and smoke migration between suites. In the upgraded system, the heat pump serves as the primary heating source, with auxiliary gas heat used only during the coldest conditions. This hybrid approach reduces gas use and allows the heat pump to be sized for typical rather than peak winter conditions, lowering costs.

Why This Retrofit at This Building?

- Aligns with QuadReal’s long-term Environmental Sustainability Goals (ESG) for this flagship property.
- The existing MUA was at end of life and needed replacement.
- Multiple incentives supported a strong retrofit business case.
- Sufficient electrical capacity to support a dual-fuel MUA system.
- Cooling was a core objective for comfort and thermal resilience.

Installation Highlights

- **Engineers:** FRESCo (mechanical), AES (electrical), RJC (structural)
- **Contractor:** Kern Building Solutions Group
- **Project Completion Date:** June 2026
- **Equipment Selection:** AAON RNA/CFA 030 series cold-climate air-source heat pump with gas back up

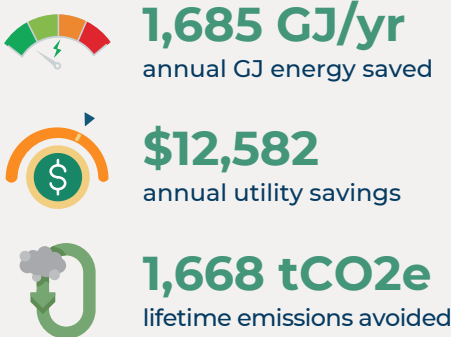
Equipment Specifications:

Airflow	Modulating up to 9,500 CFM
Refrigerant	R-454B Low-Global Warming Potential (LGWP)
Heating Capacity	Modulating heat pump 255 MBH; Gas backup 437 MBH
Gas Heating Turndown Ratio	3:1
Cooling Capacity	Modulating to 356 MBH
Coefficient of Performance	3.8 at -3°C/27°F
Heat Pump Minimum Operation Temperature	-5°C/23°F
Sound Level	Max 100 dBA

Building Details

Year Built:	2002
Building Size (sq. ft):	187,000
Number of Units:	225 + 11 townhomes
Number of Storeys:	28
Location:	Downtown, Vancouver, BC

The Expected Savings



Project Challenges

The project team addressed key challenges through coordination and technical problem-solving, including:

Equipment supply delays extended project timelines.

Crane logistics and scheduling added significant complexity and cost in a dense urban, high-rise context.

Rooftop screening obstruction required partial removal and reinstallation to accommodate the new MUA unit, adding complexity to installation.

RARA Case Study

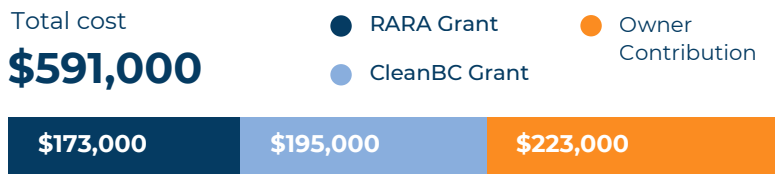
Market Rental

MUA System Cost

Total Project Cost: \$591,000

- Heat Pump Equipment: \$180,000
- Roofing: \$25,000
- Crane: \$74,000
- HVAC Materials & Labour Material & Labour: \$57,000
- Access Door: \$13,000
- Screen Removal & Reinstallation: \$62,000
- Cladding: \$40,000
- Duct Cleaning: \$4,000
- Electrical: \$39,000
- Project Management: \$97,000

Funding Breakdown



Noise Mitigation



MUA equipment produces operational noise such as humming, airflow, and vibration. If not properly isolated, this noise can travel through building structures and become a source of occupant or neighbour complaints, or conflict with municipal noise bylaws.

As part of this retrofit, measures were implemented to limit noise transfer and maintain a quiet environment, including:

- Placement of the system on the rooftop, increasing separation from occupied areas.
- Use of the existing screen wall assembly, providing an acoustic barrier.
- Internal and external vibration isolation, including installation on a custom vibration-isolation plenum curb designed to absorb and dissipate vibration.
- Flexible duct connections to prevent system vibration from transferring into the building's ductwork.

These measures work together to reduce sound transmission and support quiet and reliable operation.

“For many buildings, full electrification is not always immediately practical. A hybrid MUA system can be a strong option because it delivers meaningful emissions reductions, adds cooling, and works within real-world site and electrical constraints.”

Paul Ristow, Chief Engineer, FRESCo

R-454B Refrigerant

R-454B is a newer refrigerant (fluid used in heat pumps and air conditioners) that has 78% lower global warming potential (GWP) than R-410A and meets current and emerging federal and provincial refrigerant regulations. It performs nearly as well as older refrigerants, has lower climate impact, does not harm the ozone layer, and can be used in new equipment with only small design changes, making it a practical option for HVAC systems.



Heat pump make-up air condensing unit

Rental Apartment Retrofit Accelerator Program (RARA)

RARA™ is a free, one-stop concierge retrofit program that helps rental housing providers plan and implement energy efficiency and decarbonization retrofits, offering technical support, education, and central intake for accessing incentives and grants.

The program is led by **LandlordBC**, whose leadership and advocacy in the rental housing sector play a central role in shaping owner-focused, sector-informed retrofit approaches and accelerating market uptake.

RARA is delivered in partnership with **FRESCo**, the prime consultant, which leads participant recruitment, feasibility assessments, and engineering. FRESCo also handles system design, tendering, installation, commissioning, and performance verification.

RARA is funded by the City of Vancouver, City of Victoria, District of Saanich, the Province of BC, BC Hydro, and Natural Resources Canada through the Zero Emissions Innovation Centre (ZEIC) as part of the BC Retrofit Accelerator (BCRA).